The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WARREN B. JACKSON
SEAN ZHANG, and CRAIG M. PERLOV

Appeal 2007-2532
Application 10/608,791[1]
Technology Center 2800

Decided: August 20, 2007

Before TEDDY S. GRON, MICHAEL P. TIERNEY, and MARK NAGUMO, *Administrative Patent Judges*.

NAGUMO, *Administrative Patent Judge*.

DECISION ON APPEAL

A. Introduction

Applicants ("Jackson") appeal under 35 U.S.C. § 134 from the final rejection of claims 1–27 and 32[2]. We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

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[1] Application filed 26 June 2003. The real-party-in-interest is listed as Hewlett-Packard Dev. Co., LP. (Brief filed 1 September 2006 ("Br.") at 2.)

The subject matter on appeal relates to polymer-based memory elements that change from one detectable memory state to another by changes in chemical bonds or by changes in organic polymer doping.

Claim 1 is representative and reads:

An organic-polymer-based memory element comprising:

> two overlapping conductive signals lines; and
> at least one organic polymer layer within the region of overlap between the two signal lines,
>> the organic polymer layer having at least two detectable memory states,
>> transitions between which arise from one of changes in chemical bonds and changes in organic polymer doping.

(Br. Appendix at 1; indentation and paragraphing added.)

The Examiner has relied on the following prior art as evidence of unpatentability of the claimed subject matter:

Stasiak US 2003/0,230,746 A1 Dec. 18, 2003

Krieger US 2004/0,246,768 A1 Dec. 9, 2004

Victor Gold, *Compendium of Chemical Terminology : IUPAC Recommendations*, at 1-5, (Blackwell Scientific Publications) (1st ed. 1987).

More specifically, the Examiner has rejected claim 1 under 35 U.S.C. § 102(e)(1) over Stasiak. Jackson argues that a declaration filed by the inventors removes Stasiak as prior art and that Stasiak does not teach every limitation of the claims.

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[2] The Examiner has withdrawn a rejection of, *inter alia*, claims 28–31 (Examiner's Answer mailed 11 December 2006 ("Answer")), which are therefore not subject to this appeal.

The Examiner has also rejected claims 1–27 and 32 under 35 U.S.C. § 102(e)(1) over Krieger. Jackson does not contest the status of Krieger as prior art, but contends that Krieger does not teach every limitation of the claims.

In particular, with respect to both Stasiak and Krieger, Jackson argues that the Examiner erred in finding that they teach transitions between memory states arising from changes in chemical bonds. The Examiner supports the rejection with a teaching from Gold indicating the breadth of the term "changes in chemical bonds."

The Issue

The dispositive issue in this appeal is the meaning of the limitation that transitions between detectable memory states arise from "changes in chemical bonds."

B. Findings of Fact

The following findings of fact and any set out in the Discussion are supported by a preponderance of the evidence of record. To the extent any finding of fact is actually a conclusion of law, it should be treated as such.

Jackson's Disclosure

1. According to Jackson, recently developed non-volatile memory elements often provide organic polymer film based memory elements that have conducting "signal lines" on opposite sides of a layer of organic polymer such that the signal lines "overlap." (Specification at 1.)

2. Jackson seeks patent protection for certain memory elements that are designed to have at least two states, and that can be changed from one state to the other by changing chemical bonds in the organic polymer layer or by

changing the doping in the organic polymer in response to various techniques. (Specification at 4.)

3. We refer the interested reader to Jackson Figure 9 and to associated text (Specification at 9–11) for descriptions of embodiments corresponding to memory elements covered by the claims.

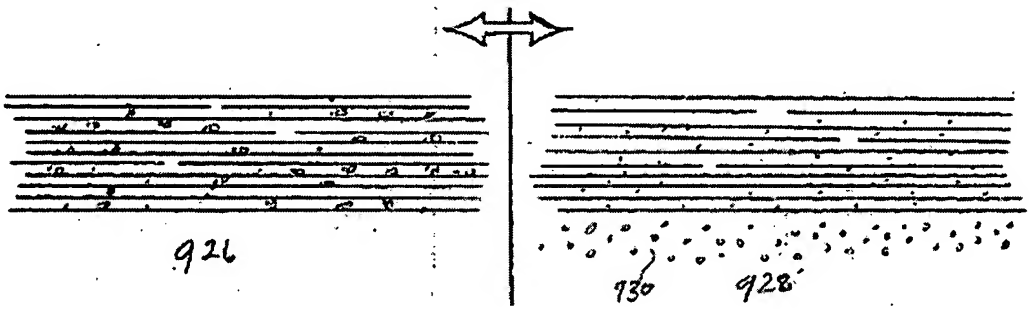
4. Claim 4 depends on claim 3, which depends on claim 2, which depends in turn on claim 1. (Br. App. at 16.)

5. Claim 2 requires first and second memory states that have higher and lower resistivities, respectively. (Br. App. at 16.)

6. Claim 3 requires that memory state transitions be initiated by applying one or more listed "facilitating agents," such as heating, electrical voltage, etc. (Br. App. at 16.)

7. Polymer-based memory elements as recited in Claim 4, have dopant chemical entities that are inactive in a first (high resistivity) memory state and active in a second (low resistivity) memory state. (Br. App. at 16.)

8. Such memory elements appear to be described most nearly in Figure 9, embodiments **926** (high resistivity state) and **928** (low resistivity state), which are shown below.



{Figure 9 is said to show an example of the invention.} [3]

[3] The text in curly braces following the Figures is provided to ensure compliance with section 508 of the U.S. Rehabilitation Act for publication

9. Figure 9 and embodiments **926** and **928** are described in the specification at 10:21 through 11:8.

10. The circles in **926** are said to illustrate inhibitors to the dopants dots and to result in a high resistance polymer layer. (Specification at 10:23–27.)

11. In **928**, the circles are said to have migrated out of the polymer layer in response to some stimulus, removing the inhibition to the dopant dots and thereby permitting the layer to be conductive. (Specification at 10:27 to 11:1.)[4]

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of this Decision on the USPTO website pursuant to the Freedom of Information Act. It is not part of the Decision.

[4] It is not clear to us how the "adjacent layer" memories covered specifically by, for example, claims 7, 8, 12, 17, and 19, work in a device that must change the resistance, as required by claims 2 or 14, from which the cited claims depend. It seems that the adjacent layer is not necessarily a high conductance layer, perhaps especially when an inhibiting substance migrates into it. As the Examiner has not raised the issue, we decline to do so here, as there may be a simple explanation. At any rate, the issue may be pursued, in the event of further prosecution, if either the Examiner or applicants see fit to do so.

Stasiak

12. Stasiak teaches a memory device as shown in Figure **1b** of the published application, shown below:

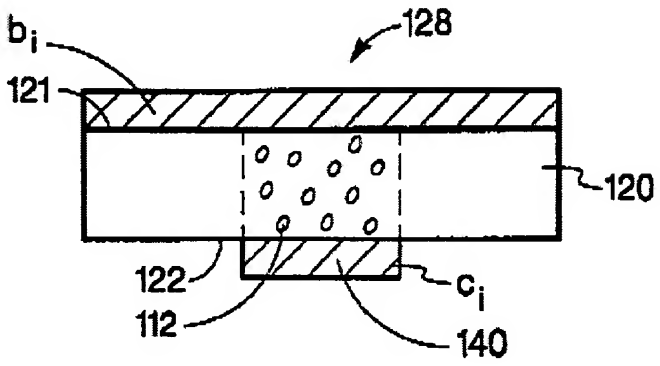

Fig. 1b

{Figure 1b is said to show a Stasiak logic cell.}

13. Referring to Figure **1b**, the memory device comprises individual logic cells **128** having an electrical conductor $\mathbf{b}_i$ on top of a layer of semiconducting polymer film **120** and electrical conductor **140** on the bottom of layer **120** that are substantially perpendicular to conductor $\mathbf{b}_i$. (Stasiak at 1, ¶ 19.)

14. As shown in figure **1b**, Stasiak teaches that an organic dopant material **112** can be added to the layer **120**. (Stasiak at 1, ¶ 19.)

15. Stasiak teaches that the organic dopant material **112** can contain electron acceptor or electron donor molecules or functional groups, such that, in Stasiak's words, "[c]harge transport, in the form of hole or electron transport, may thus occur between adjacent donor or acceptor molecules, respectively. Such a process can be described as a one-electron oxidation or reduction process between neutral functional groups and their charged derivatives." (Stasiak at 2, ¶ 23.)

16. Stasiak teaches further that "[t]he electron donor or acceptor functional groups, of the present invention, can be associated with a dopant molecule, pendant groups of a polymer, or the polymer main chain itself." (Stasiak at 2, ¶ 23.)

Krieger

17. Krieger teaches memory devices comprising a three layer structure consisting of two electrodes with a functional zone between them. (Krieger at 2, ¶ 17.)

18. According to Krieger, the electrodes may be metallic. (Krieger at 2, ¶ 17.)

19. Krieger teaches further that the functional zone can comprise an active layer based on organic materials, including polymers, that may contain, *inter alia*, ions, clusters of solid electrolytes, donor and acceptor molecules, molecules that can dissociate in an electric field or on exposure to light. (Krieger at 2, ¶ 19.)

20. In Krieger's words:

> [t]he described implementation of the functional zone allows to create a structure capable of changing the active layer resistance and/or forming high conductivity areas or lines in the active layer under external electric and/or light radiation effect on the memory cell and retaining this state for a long time without applying external electric fields.

(Krieger at 2, ¶ 19.)

Gold

21. According to Gold, "Chemical reactions are characterized by a chemical change, and they yield one or more products which are, in general, different from the reactants. Classically, chemical reactions encompass

changes that strictly involve the motion of electrons in the forming and breaking of chemical bonds." Gold, entry on Chemical Reaction.

The Rejections and the Counterarguments

Stasiak

22. The Examiner finds that Stasiak[5], in paragraphs 19 and 23, teaches memories having organic polymers having at least two detectable memory states between overlapping conductive signal lines, transitions between the states arising from changes in chemical bonds and changes in organic polymer doping. (Answer at 4–5.)

23. Jackson argues that the 131 Declaration removes Stasiak as prior art, and that Stasiak "falls far short of teaching a memory element in which transitions between detectable memory states arise from changes in chemical bonds or organic-polymer doping." (Br. at 11.)

24. Jackson argues first that Stasiak is not prior art and that the Examiner erred in declining to give significant weight to a declaration filed under 37 C.F.R. § 1.131 on 20 July 2005 ("Declaration") to demonstrate invention prior to Stasiak's filing date.

25. Jackson's Declaration reads in full:

> We hereby provide Documentation and Research Results, which establish conception of the invention claimed in claims 1–32 of the above-identified patent application and a reduction to practice of an embodiment of the invention prior to the filing date of the cited reference, Stasiak, Publication No. US 2003/0230746, Pub. Date December 18, 2003, filed June 14, 2002.

(131 Declaration at 1.)

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[5] James Stasiak, U.S. 2003/0,230,746 A1, published 18 December 2003, based on application 10/71,738, filed 14 June 2002.

26. This text is followed by a list of eight exhibits that are described as "Documentation of research results — dated [various dates from March 11, 2002 through June 7, 2002]." (Declaration at 2.)

27. The Declaration is signed by each listed inventor, and is followed by four pages of a form declaration checked, filled in, and signed by the inventors, and about 30 pages of exhibits on which hand-written circled numbers 1 through 8 may be found at successive irregular intervals.

28. Although strings of digits or digits and dashes that could be read as dates can be found on many pages, most occur as part of what appears to be a directory string, not as a separate date on the page.

29. The Declaration contains no statements by any of the declarants explaining the exhibits.

30. Jackson raises numerous complaints about the Examiner's arguments regarding the Declaration, ranging from the alleged inadequacy of the Examiner's initial response (Br. at 8–9) to the alleged untimeliness of the Examiner's remarks in the Answer (Reply at 7–11).

31. The Examiner finds the Declaration unpersuasive for many reasons, including because "there are no statements in the affidavit at all about what is shown, so there is nothing we can do but guess at what the drawings represent. In fact, no specific drawing can be identified as having an associated date, as the drawings are unlabeled." (Answer at 10–11.)

32. The Examiner responds to the argument that no changes in chemical bonds are taught by citing Gold as teaching that chemical reactions encompass changes that strictly involve the motion of electrons in the forming and breaking of chemical bonds," and that redox reactions, i.e.,

oxidation and reduction reactions, are a type of chemical reaction. (Answer at 11–12.)

33. The Examiner concludes that the oxidation and reduction processes taught by Stasiak regarding the accumulation of charges in the layer are chemical reactions that therefore involve changes in chemical bonds. (Answer at 12.)

Krieger

34. The Examiner finds that the subject matter covered by claims 1–27 and 32 are described by Krieger[6] in figures 1–6 and paragraphs 2, 19, 45, and 50. (Answer at 5–7.)

35. More particularly, the Examiner finds that Krieger shows organic polymer memory elements having an active organic polymer layer between two overlapping conductors, the polymer having two memory states, transitions arising due to changes in chemical bonds or organic polymer doping. (Answer at 5, citing Krieger ¶ 19.)

36. With regard to claims 4–13, the Examiner finds that Krieger shows, in figures 1–5 [sic: figure 5] "that the organic polymer layer is adjacent an additional layer (passive layer 5). (Answer at 5.)

37. The Examiner finds that "[t]he organic polymer layer and additional layer inherently have all of the memory-state properties of the claims because the structure and materials are the same as those of the claimed invention." (Answer at 5–6.)

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[6] Juri H. Krieger and Nikolav F. Yudanov, U.S. 2004/0,246,768 A1, published 9 December 2004, based on application 10/486,864, filed 13 August 2001, based on PCT application PCT/RU01/00334, filed 13 August 2001.

38. Jackson argues that Krieger does not mention transitions between detectable memory states arising from changes in chemical bonds, and that changes in resistivity do not imply changes in chemical bonds or organic-polymer doping. (Br. at 12–13.)

39. Moreover, according to Jackson, Krieger does not mention or suggest that the state change is reversible. (Br. at 13.)

40. Jackson argues that claims 2–32 all depend ultimately from claim 1, and that the rejection must fail for them as well. (Br. at 13.)

41. Jackson argues that "specific rejections of many of the dependent claims are completely unsupported by the cited references." (Br. at 13.)

42. Jackson, however, argues only the rejection of claim 4 specifically.

43. According to Jackson, "[n]either Figure 5 of Krieger nor any text referencing Figure 5 in Krieger teach[es], disclose[s], mention[s], or suggest[s] a memory cell in which organic-polymer dopants are active in one memory state and inactive in another memory state." (Br. at 13.)

C. Discussion

Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc., 246 F.3d 1368, 1374, 58 USPQ2d 1508, 1512 (Fed. Cir. 2001) ("A claim is anticipated if each and every limitation is found either expressly or inherently in a single prior art reference." (Citation omitted.)) During prosecution, "the PTO applies to the verbiage of the claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048,

1054, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997). On appeal, the burden is on the applicant to demonstrate reversible error by the Examiner.

Stasiak

Jackson argues that Stasiak has been removed as prior art by the declaration filed under Rule 131. (Br. at 8–9.)

We begin by noting that Jackson's complaints relating to the conduct of prosecution are not before us, as our jurisdiction is limited to review of rejections. Relief from procedural matters believed to have been handled improperly falls under 37 C.F.R. § 1.181, and may be sought in varying degrees of formality ranging from a request for reconsideration by the examiner in a telephone interview to a formal petition to the Director. There is no indication in the record before us that Jackson sought any such relief.

On the merits, Jackson apparently believes that the exhibits speak for themselves and that no explanation of what they show or how they support conception and actual reduction to practice is necessary. (Reply at 11.) Jackson is mistaken. It may sometimes be the case, for example, in a simple area of art that is within the everyday experience of the ordinary person, that an explanation of an exhibit would be a superfluous formality. In the present case, which involves several complex technologies (physics and chemistry of polymers, including conductive polymers, integrated circuit manufacture, etc.), explanations are mandatory. Moreover, even a declaration regarding an actual reduction to practice of an invention in a simple technology requires some explanation or authentification of what the exhibits are.

> Rule 131 reads in most relevant part:
> b) The showing of facts shall be such, in character and weight, as to establish reduction to practice prior to the effective date of

> the reference . . . Original exhibits of drawings or records, or photocopies thereof, must accompany and form part of the affidavit or declaration or their absence must be satisfactorily explained.

37 C.F.R. § 1.131(b) (2006).

Some three decades ago, one of the predecessor courts of the Federal Circuit criticized an affidavit submitted under Rule 131 that was significantly more detailed than the declaration submitted in this case by Jackson. In that case, affiants described the contents of three exhibits, namely an invention disclosure, and 15 pages of what appeared to be records of laboratory data. *See, In re Borkowski*, 505 F.2d 713, 716, 184 USPQ 29, 33 (CCPA 1974). The court criticized the declarations in the following words:

> The original and supplemental affidavits together with the accompanying comments do not adequately explain what facts or data appellants are relying upon to show a completion of their invention prior to April 13, 1961. The affidavits for the most part consist of vague and general statements in the broadest terms as to what the exhibits show along with the assertion that the exhibits describe a reduction to practice. This amounts essentially to mere pleading, unsupported by proof or showing of facts. . . .
>
> A review of the fifteen notebook pages of Exhibits 2 and 3 reveals that they are by no means clear on their face. It was appellants' burden to explain the content of these notebook pages as proof of acts amounting to reduction to practice. That was not done . . . Absent a clear explanation of the remaining notebook pages pointing out exactly what facts are established therein and relied on by appellants, the affidavits based thereon are of little assistance in enabling the Patent Office and its reviewing courts to judge whether there was an actual reduction to practice of the invention.

Borkowski, 505 F.2d at 718–19, 184 USPQ at 33 (emphasis added).

Here, Jackson has provided what appears to be processed data, not original notebooks. Aside from the list of contents at page 2 of the declaration, there appear to be no unequivocal dates on the exhibits. Indeed, Jackson even fails to allege a particular date on which an actual reduction to practice was accomplished and recognized. Moreover, the declaration fails to point out what facts, in the opinion of the declarant, were established. There is no explanation relating the exhibits to the limitations of any of the claims. Jackson does not even appear to have alleged in its principal brief which type of memory—i.e., transition arising from change of chemical bonds or from change of organic polymer doping—was actually reduced to practice. Jackson's Declaration amounts at most to mere pleading. As the Examiner points out, "there is nothing we can do but guess at what the drawings represent." (Answer at 11.) We decline to guess at facts it was Jackson's burden to establish.

On the present record, Jackson has failed to carry its burden of antedating Stasiak as prior art.

Claim 1 requires that the organic polymer layer have at least two detectable memory states, "transitions between which arise from one of changes in chemical bonds and changes in organic polymer doping."

Jackson argues that the Examiner erred in rejecting claim 1 over Stasiak because Stasiak fails to disclose transitions between memory states arising by changes in chemical bonds or by changes in organic polymer

doping. (Br. at 11.)[7] According to Jackson, "[t]ransitions between detectable memory states in an organic-polymer layer do not imply changes in chemical bond or in organic polymer doping. Such transitions may result from accumulation of charge, changes in polymer orientations, and from many other changes that do not involve changing chemical bonds or organic-polymer doping." (Br. at 13.) Jackson argues further that "it is accumulation of charge, rather than changes in chemical bonds and changes in organic polymer doping, to which Stasiak explicitly attributes the electronic properties of his memory cell." (*Id.*)

Jackson does not direct our attention to any definition in the specification of what is meant by "changes in chemical bonds". Our review indicates that no special definition has been provided. We therefore interpret this limitation in the broadest reasonable manner consistent with the disclosure. As the Examiner has shown via the Gold reference, chemical reactions involve changing at least one chemical bond in a molecule.

Stasiak, in paragraph 23, teaches that dopants are useful additives to polymers suitable for its invention. In Stasiak's words, dopants are compounds that promote charge transport via a "one electron oxidation or reduction process between neutral functional groups and their charged derivatives." Applying the broadest reasonable interpretation of the term "changes in chemical bonds" consistent with the disclosure, we have no difficulty concluding that changes introduced by the dopant materials disclosed by Stasiak change chemical bonds under the influence of some

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[7] Jackson does not dispute the Examiner's findings that Stasiak discloses the other limitations of claim 1, and we hold such arguments to have been waived.

external trigger and thereby give rise to the changes in the detectable memory states. Without the changes in chemical bonds, there would be no change in memory state. Under these circumstances, it was reasonable for the Examiner to find that the transitions in memory states "arise from" the changes in the chemical bonds.

Jackson's argument that claim 1 excludes transitions between memory states involving accumulations of charge or polarization currents (Br. at 11) is misplaced whenever, as in Stasiak, the accumulations of charge or the polarization currents involve changes in chemical bonds. It is improper to read limitations from examples in the specification into the claims.

Accordingly, the rejection of claim 1 as anticipated by Stasiak under 35 U.S.C. § 102(e) is AFFIRMED.

Krieger

The Examiner relies on the disclosure by Krieger of memory devices having the same general layout of overlapping conductors sandwiching a layer of material that can be organic polymers to reject claims 1–27 and 32 as being anticipated. In particular, Krieger teaches that "[t]he described implementation of the functional zone allows to create a structure capable of changing the active layer resistance and/or forming high conductivity areas or lines in the active layer under external electric and/or light radiation effect on the memory cell." (Krieger at 2, ¶ 19, emphasis added.)

Jackson argues that Krieger fails to disclose memory elements that arise from changes in chemical bonds or changes in organic polymer doping as required by claim 1. (Br. at 12–13.) Jackson urges further that "many of the dependent claims are completely unsupported by the cited references" (Br. at 13), but provides a specific argument only for claim 4 (*Id.*). We shall

therefore consider only arguments for the patentability of claims 1 and 4, all other arguments having been waived. 37 C.F.R. § 41.37(c)(vii) ("the failure of appellant to separately argue claims . . . shall constitute a waiver of any argument that the Board must consider the patentability of any grouped claim separately.")

Jackson's arguments with respect to the rejection of claim 1 over Krieger are essentially the same as those raised against the rejection over Stasiak. (Br. at 12–13.) Here, where Krieger expressly describes memory cells in which the resistance of memory elements changes the memory state (Krieger at 2, ¶ 19; FF 20), we find that the weight of the evidence favoring anticipation outweighs the evidence to the contrary. Jackson's argument that Krieger fails to disclose a reversible memory state change (Br. at 13) is misplaced, as there is no such limitation in claim 1 or in any of the dependent claims. Patentability cannot be premised on a limitation that is absent from the claimed subject matter. *In re Self*, 671 F.2d 1344, 1348, 213 USPQ 1, 5 (CCPA 1982). Accordingly, we hold that Jackson has failed to prove reversible error by the Examiner.

Claim 4 depends on claim 1 via claims 2 and 3. Claim 2 requires that the memory element have a first memory state having a high resistance and a second memory state having a low resistance. Claim 3 requires that the memory state transition be triggered by one or more listed agents. Claim 4 requires that the organic polymer layer contain dopants that are not active in the first memory state and active in the second memory state. Jackson argues that Figure 5 and the associated text, on which the Examiner relies, neither describe nor suggest such a memory. Krieger shows in Figure 5 a memory cell having an active layer **3** and a passive layer **5**. (Krieger at 3,

¶ 39.) Krieger describes Figure 5 in relevant part as having an active layer of "polystirol" and a passive layer of copper or silver [c]halcogenide. (Krieger at 4, ¶ 57.) The Examiner argues that the Krieger memory cells "inherently have all of the memory-state properties of the claims because the structure and materials are the same as those of the claimed invention" (Answer at 5–6); but the Examiner cites no specific supporting disclosure in the specification. Our review shows that there is no apparent description of a dopant in the memory cell shown in Figure 5, much less a dopant that is active in the first, high resistance state, and inactive in the second, low resistance state.

Ordinarily, this would be the end of the inquiry. However, Krieger, in paragraph 19, cited by the Examiner and quoted *supra*, describes memory cells that can be switched from one state to another. A typical memory structure, shown in Figure 1, has an active layer based on organic polymers with dopants that allow creation of a "structure capable of changing the active layer resistance and . . . forming high conductivity areas or lines in the active layer under external electric and/or light radiation effect on the memory cell." (FF 19 and 20; Krieger at 2, ¶ 19.) Thus, Krieger describes a doped organic polymer-based memory element that can be switched from a low conductivity state (dopant inactive) to a high conductivity state (dopant active) in response to a stimulus, e.g., a shift in voltage or illumination. On this record, we therefore AFFIRM the Examiner's rejection of claim 4.

D. Summary

In view of the record and the foregoing discussion, it is:

ORDERED that the Examiner's rejection of claim 1 under 35 U.S.C. § 102(e) as anticipated by Stasiak is AFFIRMED.

FURTHER ORDERED that the Examiner's rejection of claims 1–27, and 32 under 35 U.S.C. § 102(e) as anticipated by Krieger is AFFIRMED.

FURTHER ORDERED that no time period for taking any subsequent action in connection with this appeal maybe extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

VW

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